SYMPATHETIC OPHTHALMITIS:—A Clinical and Pathological Study.

A Thesis for the Degree of M.D. in the University of Edinburgh,

BY

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SYMPATHETIC OPHTHALMITIS:- A Clinical and Pathological Study.

The following Thesis is the outcome of reading and personal observation during ten months which I have spent as house surgeon in the Ophthalmic In-:stitution, Glasgow.

In that time I have seen about 30 cases of Sympath-:etic Ophthalmitis, but unfortunately for my present purpose I have not seen a case develope and progress under my own eye, because in all recent accidents in which the fellow eye was likely to suffer the excitor was removed on the first sign of irritation in the Sympathiser. I have been able, however, to watch the disease throughout all its stages, because most of the patients whose cases I shall record later on came to the hospital suffering from pernicious iritis, although they had been treated elsewhere for the injury which had given rise to the disease. The result of my observation has only been to confirm the experience of others, that Sympathetic Ophthal-:mitis is a disease most insidious in its onset, most intractable in its progress, most obstinate to treatment, and most disastrous in its results.

To Dr. A. Maitland Ramsay, Surgeon to the Ophthalmic Institution, my thanks are due, not only for

for the permission to make use of hospital material, but also for much kindly encouragement.

History.

In MacKenzie's Practical Treatise on Diseases of the Eye, 1839, we find the first lucid and exhaustive description of Sympathetic Ophthalmitis. He was not, however, the first to call attention to this disease, for as far back as 1583, Bartisch says that after injuries to the eye it is apt to atrophy, and the other good eye is also in great danger. In 1696, according to Brondeau[3], Bartholinus quotes a case of incipient cataract, following injury to the fellow eye, which was destroyed. It is doubtful if this really was a case of Sympathetic Ophthalmitis, but in 1818, three cases were described by Demours[4], which, without doubt, were sympathetic in character.
According to Randolph[5], Demours was the first physician in France to call attention to the disease.

Since MacKenzie's Classical work, much has been written, and much valuable work done to make clear the true nature of this insidious and dangerous disease, but unfortunately its pathology is still somewhat obscure.

Definition.

Sympathetic Ophthalmitis is a malignant uveitis, serous or plastic in character, of one eye, caused by a plastic uveitis in the fellow eye, resulting as a rule from a penetrating injury to that eye.

Etiology.

The disease manifests itself frequently in strong, healthy-looking men, but on a close examin-:ation into the history of such, we frequently find some constitutional defect, as a result of syphilis, alcohol, etc.

It is more frequent in men than in women, because, no doubt, of the greater liability that men have to injuries.

Delicate and neurotic subjects are specially liable to the disease, and it is very common in children. I have examined the blood of patients under treatment, but the only change I can find is a slight diminution of Haemocytes and Haemoglobin. The Leucocytes are neither increased nor diminished.

Exciting Causes.

Injuries.

There can be no question that the most common cause is a penetrating wound of the eyeball, and much doubt is expressed as to the possibility of Sympathetic following an injury unless where a penetrating wound has been inflicted.
MacKenzie says a mere blow on the eyeball without causing a rupture has been known to affect the other eye sympathetically.
Brouner quotes a case after concussion of the eye-:ball with no visible external wound.
MacKenzie also describes a case where Sulphuric Acid was thrown into a girl's eye, and it was followed a month or two later by Sympathetic Ophthalmitis. This case, however, can be explained, for

for the whole cornea was destroyed, and the entrance of infection rendered almost inevitable.

The penetrating wounds most liable to set up Sympathetic Ophthalmitis are those in the region of the ciliary body, especially if lacerated and accompanied by a prolapse of iris or ciliary body. The cases which have come under my notice here, with few exceptions, have been caused by wounds of the eyeball, and in the majority the ciliary body was implicated, and in several there was prolapse. In addition to protrusion of the iris or ciliary body, there is frequently loss of vitreous. The risk is increased if there is also a wound of the lens, as it swells up, and pressing against the wounded or inflamed ciliary region, acts as a foreign body and increases the irritation.

More important perhaps than the site of the wound, is the state of the instrument which caused it, for the liability to Sympathetic Oph-:thalmitis is much greater if the instrument be not clean, in fact it is doubtful if a wound caused by a clean, i.e., sterile instrument, can set up changes in that eye which will lead to sympathetic in the other; provided there is no subsequent infection.

Randolph[5] in a series of experiments on dogs inflicted wounds in ciliary region, producing at the same time prolapse of iris, but in none of the cases did Sympathetic follow.

Surgeons are daily called upon to make wounds of the eyeball in the neighbourhood of the ciliary region, but in spite of the countless operations, ~~how~~ few cases of Sympathetic Ophthalmitis as a result are recorded. MacKenzie states that he has never seen a case of Sympathetic follow a cataract. Unfortunately many cases have been recorded since. The following are examples of such:-

Mrs. McF., aet 62, was admitted in September 1st, 1900, suffering from immature cataract in both eyes. On the 4th an iridectomy was performed on the left, and on the 23rd of January, 1901 the lens was successfully extracted. Iritis unfortunately set in a few days after the operation, resulting in a closed pupil. An iridotomy was performed on the 8th of May, but vision was not much improved by it. A month later patient came to Dispensary complaining that her sight was rapidly getting worse in the other eye, and this was at first thought due to the advancing cataract in

in it, but on closer enquiry and examination it was found that she had some pain in the eye, and that it frequently watered. The iris too showed some congestion, and was at points adherent to the capsule of the lens. The left eye was at once enucleated, but this proved futile, and the in-:flammation steadily progressed, and now there is only a bare perception of light. The iris is disorganised, and adherent to the cataractous lens, and these together are pushed forward and have almost obliterated the aqueous chamber. In September 1901 an iridectomy was performed in right in order to improve eyesight, but the operation was followed by considerable pain and inflammation. The coloboma produced quickly filled up with exudate.

On macroscopic examination of the globe, which had been enucleated, the anterior chamber was found to be completely filled by membrane with iris, ciliary body and exudate attached. The retina was completely detached, and passed as a fibrous cord from pupillary membrane to optic nerve. The space between choroid and retina was filled

filled with a jelly like exudation.

Microscopic (Plate No.1) on examination of a section through cornea and ciliary body, two corneal wounds are to be seen, result of the oper-:ations, and each of these wounds is connected with an organising round celled exudate, which covers the whole of the back of cornea and passes without interruption into the remains of iris and ciliary body. Only a narrow cleft at one point represents the anterior chamber of the eye. The remains of a degenerated retina can also be seen in section. The optic nerve (Plate No. 2) shews distinct pathological cupping, the subvaginal spaces being dilated, while the body of nerve itself exhibits an increased number of round cells.

T. K., aet 60, was admitted on November 11th, 1897 with cataract in both eyes. On the 17th the left lens was extracted by a combined operation. The patient was very restless, and on the night follow-:ing operation got up out of bed. On dressing eye next day evidence of infection was discovered: the eyelids were eodematous and glued together by a

a purulent material. The conjunctiva was chemosed and injected, wound was infiltrated and there was some pus in anterior chamber. With careful treatment the condition did not go on to a general panophthal-:mites, some sloughing of cornea resulted, but wound eventually closed.

On January 12th the patient was allowed to get up, but he refused to keep a bandage on and was con-:stantly fingering the eye, the result was that wound re-opened and a prolapse of iris occurred.

On January 14th the fellow eye became tender and vision diminished. The left eye was enucleated that day, right eye was fomented and mercurials given, and condition gradually improved till 20th, when pain became more severe and there was ciliary tenderness and marked photophobia.

The right temple was freely leeched, and this was followed by improvement. He was dismissed on February 1st with eye quite quiescent.

Since that date patient has had frequent inflammatory attacks in this eye, and when last seen at Dispensary was completely blind.

On bacteriological examination of the enucleat-:ed eye

eye, Staphylococcus Pyogenes albus and Pneumococcus (Streptococcus Lanceolatus) were found.
Microscopically (Plate No. 3.) the corneal wound can be seen, un-united, and with exudate and remains of lens capsule lying between the cut surfaces. There is a dense exudate lying against back of cornea, and obliterating the anterior chamber. An intense cyclit-:is is present, and the exudate in region of ciliary body contains numerous pigmented cells. The retina which is separated from the choroid posteriorly is degenerated in parts, and shews several haemorrhages and dilated blood vessels. A slight physiological cupping of the optic nerve is present, and there is also some neuritis (Plate No. 4.)

A.D., aet 53, was admitted on November 4th, 1901, with left pupil closed by an opaque membrane, second-:ary to a cataract operation in September. The cataract, he said, had been caused by a blow from a cork. The right eye was normal on admission.
On November 6th the capsule was divided by Carter's scissors and removed by capsulotomy forceps. Perfect healing resulted and there was no iritis.
On November 4th he was dismissed with vision $\frac{6}{18}$ $\bar{c}$ +8 D sph., and he could read Jaegar 12 $\bar{c}$ +14 D sph.

On November 23rd he noticed some dimness of vision in right eye, and it was accompanied with slight pain in eyebrow$ and eyeball. This continued, and on December 3rd he was re-admitted with distinct iritis in right eye. He was unable to read type, and could count fingers only at 3 metres distant. The visual field was slightly contracted.

On examination of eye the pupil was small and sluggish, and the iris distinctly hyperaemic. Tension increased. Patient was put to bed and atropine instilled into eye. A mixture composed of Iodide of Potassium and Perchloride of Mercury was administered internally. An ointment of mercury and belladonna was massaged into right eyebrow, and the left temple was blistered.

On December 16th V = $\frac{6}{60}$. Pupil has yielded very little to atropine and is irregular. Iris looks quieter and the pain has gone. No fundus details could be made out owing to a general haziness of media.

On January 6th he was very much improved, vision still only $\frac{6}{60}$, but clearer. Pupil has yielded to atropine and is much less irregular.

He has attended Dispensary frequently since, and the eye

eye continues to improve.

Foreign bodies in the eyeball are a source of great danger to the other eye, for not only have we the risk caused by the perforating wound, uncleanliness ~~etc~~. of foreign bodies etc., but by its presence, especially in ciliary region, it tends to keep up a constant irritation of the ciliary body.
Since the introduction of X Rays and Electro-Magnet the risk of Sympathetic has been greatly diminished in regard to foreign bodies, for it is frequently a fragment of metal which enters the eye, and if such a case be seen early and the metal removed within a few hours, a good recovery is often made, with little trouble to either eye.
Very different, however, is the condition when the foreign body is such that the magnet fails to extract it, and other means are also unsuccessful. There may be little trouble at time of accident and the eye may remain quiescent for many years, but there is a constant risk of Sympathetic Ophthalmitis as long as the foreign body remains in the eye.
The following case is of interest on account of the

the length of time foreign body remained in the eye without causing any irritative symptoms, and then without any apparent cause setting up intense inflam-:ation with irritation in the other eye, and risk of Sympathetic inflamation.

J. H., aet 31, was admitted on March 22nd, '00, complaining of recurrent inflamation of the left eye and rapidly failing sight. When asked as to a history of injury he said that 20 years ago, while standing one day in a blacksmith's shop, he was struck on this eye by a piece of metal. He was treated for the injury and made good recovery, and until quite recently he had no further trouble with the eye; when however he began to suffer pain in it, and to notice that the sight was failing rapid-:ly. He could give no reason for the attacks. On admission to the hospital the eye was very painful and tender to touch, and there was pericorneal injection, the iris was discoloured, the pupil small and irregular, the vision very defective, and owing to opacities in the media no fundus details could be made out. On March 30th he was seized with very severe pain, accompanied by retching and vomiting, and in the morning pus was found in the anterior chamber.

He had repeated attacks of a similar nature till the month of August, when, owing to a severe pain and presence of Sympathetic irritation in the other eye, he was persuaded to have the eye enucleated.
On examination of the eye after enucleation an irido-cyclitis was found to exist, the lens was dislocated, and embedded in the ciliary region was a small fragment of steel.

In the following case foreign body was removed, but Sympathetic ensued:-
J. T., aet 42, was admitted on February 20th, '00, with the history that he had been struck on right eye by a piece of steel. On examination, a small wound was found to the outer and lower side of cornea-scleral margin penetrating all the coats. The iris protruded through the wound and pupil was oval in shape. He suffered very severe pain. On examination by X Ray, a large piece of metal at least ¼ inch in length was made out, situated in upper zone of eye-:ball. An attempt was made to remove the metal by the electro-magnet, but this was unsuccessful, so a small incision was made over seat of foreign body, which was

was then extracted. On day following operation there was some pain, chemosis, and swelling of the lids, but on the 3rd of March pain had quite gone, and eye was quiet. Vision nil. On March 11th patient suffered from headache and pain in back, this continued till the 26th, when it was noted that on exposure to light the left eye suffered from profuse lachrymation. On ophthalmoscopic examination, media was found to be clear, but an early optic neuritis was discovered. The right eye was enucleated, and this was followed by gradual recovery in left.

On pathological examination the retina was detached, and between it and the choroid was a dense fibrinous exudation. The vitreous was reduced to half its normal size, and also infiltrated. The lens dislo-:cated downwards. Anterior chamber shallowed and filled with exudate.

Wounds of the cornae with have become infected, re-:sulting in a Serpiginous ulcer may cause Sympathetic Ophthalmitis, especially if perforation has occurred. It is doubtful if Sympathetic Ophthalmitis can follow without perforation, as it has been almost conclusive-:ly

conclusively proved that the pus found in the anterior chamber of an eye suffering from infected ulcer is sterile. I have made agar cultures of the pus in many such cases, and with the exception of one, got negative results. I can find no mention in the journals of this institution of Sympathetic Ophthal-:mitis caused by an infected ulcer, but the following is an account of a case which I attended two years ago:-

J.O., aet 42, was struck on the left cornea with a fragment of stone. The fragment, which had become embedded in the cornea, was removed, but an infected ulcer resulted. In spite of treatment, the condition gradually became worse, pus collected in anterior chamber, and a cyclitis ensued. As ulcer spread and perforation seemed imminent, Saemisch's operation was performed, and the wound kept open by a spatula. The condition improved greatly after operation, but about 3 weeks after injury, patient began to complain of pain in right eye, photophobia and lachrymation. The injured eye was at once removed. Improvement in right followed enucleation of left, but since then the patient has had frequent attacks of pain and inflammation. His condition, when last I saw him in

in April, 1902, was as follows:- Vision very much diminished = $\frac{3}{60}$. Pain varying in intensity and some ciliary tenderness. Tension somewhat above normal. On instillation of atropinethe pupil dilated, but irregularly, and no view of fundus could be obtained owing to haziness of vitreous and early cataractous state of lens. There was a marked pericorneal in-:fection.

Degenerative changes in an eye, especially following an injury, may produce Sympathetic in the other eye. It is specially liable to occur in shrunken eyeballs which are tender to pressure owing to the existence of a slow progressing irido-cyclitis. One finds on section of such eye a calcified lens, detached retina, thickened and ~~maybe~~ generally ossified choroid.

Cases of Sarcoma of Choroid have been followed by Sympathetic Ophthalmitis in the fellow eye. Accord-:ing to Randolph[5], Schirmer describes cases of irri-:tation caused by Sarcoma of Choroid. Brailey in the Oph. Hosp. Report, London, 1886, also describes a case

Sympathetic has been known to follow Glioma of Retina (Alt.)

Cysticercus is said also to be a cause.

In all cases, however, a co-existing cyclitis is reported to be present.

Symptoms.

Sympathetic Irritation.

Sympathetic Irritation is at present regarded by the majority of Ophthalmic Surgeons as a condition apart from Sympathetic Inflammation, and apparently in many cases of genuine inflammation there is but slight evidence of a premonitory irritation. It seems safer, however, to look upon all cases of Sympathetic Irritation as implying a possibility of subsequent inflammation.

The symptoms of irritation may manifest themselves at an early date after receipt of the injury, but as

as a general rule it is after a period of 2 or 3 months (i.e.) when the injured eye has passed into the later stages of inflammation. Frequently the first symptom which a patient comes complaining of is weakness of the sympathizing eye. He states that after reading for some time, the letters become blurred, and that he is unable to read so long as formerly. There is not ~~as~~ much actual diminution of sight at this stage of the disease.

Photophobia with a resulting Blepharospasm are sometimes the first and only symptoms complained of. When the lids are separated, and a bright light brought into proximity of the eye, severe pain may be complained of, usually in the region of the temple or forehead, and even radiating to the back of head.

Lachrymation is very common, generally it is slight, but at times very profuse. It may occur after using the eye for near work, such as reading or sewing, or only when the eye is exposed to light. It is worse gen-
:erally when the exciting eye is painful and some-
:times only present then.

Concentric narrowing of the visual field is frequent-
:ly observed

observed; this, however, is most often found in cases passing from the stage of irritation into that of inflammation.

Disappearance of objects is also described as a symp-:tom. The patient, when looking at something, suddenly loses sight of it for a few seconds or longer, and then it appears again. I have found this symptom in one case.

On objective examination of the eye very little is to be made out. There is usually slight injection of the subconjunctival vessels. On ophthalmoscopic examination, a slight fulness of the veins and tort-:uosity of the retinal vessels, with some hyperaemia of the disc may be observed.

The following cases are, I think, good examples of Sympathetic Irritation:-

Mrs. F., aet 30, was admitted on January 13th, 1902. She stated that at the age of 8 she was struck on the left eye by the handle of a door. In-:flammation followed, and when this had subsided an operation was performed. Since that time the eye has been blind, and she has had frequent attacks of inflammation in it.

The right eye remained quite normal till 4 months before

before admission, when, after the birth of a child it became irritable, and she suffered constantly from photophobia, lachrymation and blepharospasm. On admission, there was considerable pain in the left eye, lens was cataractous, and pupil occluded. There was marked ciliary tenderness, and vision was reduced to a bare perception of light.

In the right eye there was marked photophobia, blepharospasm, and some lachrymation. No diminution of visual acuity, nor was there any narrowing of the visual field. The eye shewed slight pericorneal injection, and the fundus appeared normal, though examination of it was rendered difficult by the intense photophobia which existed.

On January 15th the left eye was enucleated, and by the following day the right eye was quite free from irrition, and has continued so since.

On examination of the enucleated eye there was found to be a complete separation of the retina. The lens was absent and replaced by a fibrous membrane from which the detached retina stretched across the globe to be attached to the optic nerve.

Microcopically (Plate No. 5) the cornea is observed to be thrown into peculiar folds on its posterior aspect.

The infiltrationspace at one side of section is com-
:pletely filled up by a fibro-cellular exudate from the anterior surface of iris. Scattered over Descemet's membrane a few pigment cells can be observed. The iris is firmly adherent to the capsular membrane and is infiltrated with lymphoid cells.
The ciliary body is detached and also infiltrated with round cells, and passing from it is the degener-
:ated retina, infiltrated with similar cells.
The choroid shewed numerous projections on its inner aspect, the so-called "colloid excrescences".
No change could be made out in the papilla or optic nerve.

Wm. F, aet 28, admitted November, 1901. History. The patient was struck on the left eye by a fragment of metal the day before admission. On examination, a central wound of the cornea was found, and the lens was seen to be cataractous. The eyeball was very soft and tender to touch. An X Ray photograph shewed a foreign body situated about 4 m.m. behind cornea and in upper zone of the interior of eyeball.

Chloroform was administered and electro-magnet applied with negative result, so an iridectomy was performed and lenticular matter washed out. A probe was then inserted into wound, but no foreign body felt. An incision was next made at supposed site of foreign body, but all attempts to reach it were unavailing, so conjunctiva was stitched over scleral wound and bandage applied.

On November 16th the eye looked very quiet, pain and ciliary tenderness slight. There was a con-:siderable amount of blood in it, and vision reduced to a perception of light.

On November 25th he complained of considerable pain in left eye, and the ciliary tenderness was more marked. Temple was leeched and foments applied. Calomel and opium were administered internally.

By November 30th the pain was quite gone and very little ciliary tenderness remained. The eye contin-:ued to progress favourably till a month later, when patient complained of weakness in right eye and which had a watery appearance. On ophthalmoscopic examination the vessels of fundus appeared somewhat angry. Vision = $\frac{6}{24}$ (with atropine) A few days later some shrinking was noticed in region of scleral wound

wound, so on January 8th eye was enucleated.
On January 11th patient was dismissed, the irritable condition of right eye having subsided.
On February 21st I saw him at the Dispensary, and he complained that on the previous day he suddenly lost sight of objects on the temporal side of his visual field. This lasted for two hours, and was followed by headache, apparently an attack of Migraine.
Vision = $\frac{6}{9}$. Visual field not contracted.
March 20th V - $\frac{6}{6}$. Eye quite strong.
On examination of the enucleated eye, a small piece of metal was found deeply embedded in the sclera. The retina was detached at this point and apparently dragging upon ciliary region in vicinity of the wound.
On Microscopic examination (Plate No.) an early cyclitis was found, otherwise nothing abnormal.

Sympathetic Inflammation.

The symptoms of Sympathetic Inflammation most frequently become manifest about 6 weeks after the injury. There is, however, as in Sympathetic Irritation, no time limit, and it may begin as early as

as 3 weeks after injury, or there may be no manifest-:ation of the disease for many years afterwards- cases are reported as late as 40 years.
Usually we find it occurring earlier than Sympathetic Irritation, and from this fact alone many reason that the conditions are entirely separate.
The following is a typical example of Sympathetic Inflammation in its serous stage, where there was also an undoubted history of previous irritation:- D. McA., aet 49, was admitted on February 7th, 1902, with malignant iritis of left eye, and the right merely a shrivelled stump.
History. Right eye was injured eleven years ago by a blow with a stick about the month of August. He was seen by a practitioner, and told that he had ~~distraction~~ dislocation of the lens. In September inflammation started in right eye, for which he treated himself at home, and in October, while stooping to tie his boot-lace, the eyeball burst. The stump is now shrivelled and tender to pressure. A few weeks after the bursting of eyeball he had severe photo-:phobia in left eye, which lasted for 3 or 4 weeks. During the photophobia he had severe pain and in-:flammation in injured eye. The photophobia passed off

off entirely, but on several occasions since he has had lachrymation in left. There was no diminution of sight at these times, but about 3 weeks before admission his sight began to fail, and when admitted he was unable to distinguish types, but could count fingers at 2 metres though not distinctly. Visual field normal. He complained of the presence of black specs floating in front of eye. No pain.
On examination there was marked pericorneal inject-:ion: iris discoloured and swollen: pupil circular, contracted and responds sluggishly to light: dilates irregularly to atropineowing to posterior synechiae. Tension above normal. Slight ciliary tenderness. With corneal microscope, deposits could be seen on Descemet's membrane and anterior capsule of lens. The cornea had a hazy appearance and vessels could be seen invading its margin.
Ophthalmoscopic examination. Fundus cannot be made out owing to haziness of vitreous.
On February 8th right eye was enucleated. Atropine instilled daily into left: Mercury and Belladonna ointment massaged into left temple and eyebrow. Quinine and mercury were given interhally.
On February 9th there was a great improvement in left,

left, pupil yielded more regularly to atropine. He said that vision was clearer, and black specs fewer. On February 17th V = $\frac{3}{60}$. Pupil well dilated but still somewhat irregular. Cornea clearer but vitreous still cloudy, and a coppery pigment deposit on anterior capsule of lens was well marked. On February 18th patient was dismissed to convales-:cent home. (Further progress given with treatment)

Pathology.

On bisection of the enucleated globe which was shrivelled and shrunken, the sclera was seen to be thrown into folds: the retina detached and stretched as a cord towards remains of lens, which was buried in exudate, and completely surround-:ed by exudation.

From the history of above case it is apparent that irritation had been more or less present since a few weeks following rupture of the eyeball, and in all probability had the eye been enucleated at the first sign of irritation no further trouble would have been experienced. This however is not always the case, for some cases of Sympathetic Ophthalmitis have developed and pro-:gressed even after the exciting eye has been enucleated.

The following case is an example:-

J. E., aet 32, was admitted on November 3rd, 1900, with a history of having been struck on the left eye by a piece of metal the day previous to admission. On examination the left upper eyelid was found to be cut through, and there was a wound of the eyeball near corneo-sclerotic margin at upper and inner part: anterior chamber deep and filled with blood. Iris active but oval in shape. Vision right = $\frac{6}{6}$. Vision left = less than $\frac{6}{60}$. An X Ray photo was taken and revealed a foreign body, which on the 4th was removed by the electro-magnet. It proved to be a thin sharp edged chip of steel, which was very dirty. It was entangled in the iris, and when extracted, drew a large portion of that structure through the wound along with it. The lens was cataractous, and in the vitreous something resembling a flake of pus could be seen.

As he had considerable pain after the operation the eye was dressed, and a slight purulent discharge noticed on the dressing. Anterior chamber was full of blood.

On the 5th there was slight conjunctival chemosis, but

but patient did not complain of any pain.

On the 9th chemosis more marked, and there was some discharge from the upper wound.

On the 26th some shrinking of the eyeball was noticed at site of operation wound, and as this gradually became more marked, the eye was enucleat-:ed.

He was dismissed on the 15th of December with right eye apparently quite healthy, and vision normal.

Three months after dismissal, patient came to the Dispensary, complaining of dimness of vision in the right eye. V = $\frac{6}{9}$.

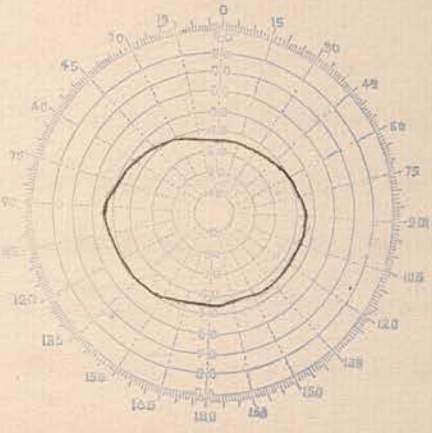
On examination the anterior part of the uveal tract appeared quite normal, but ophthalmoscopically an early neuritis was discovered. There was no apparent irritability of the stump.

Under treatment his condition greatly improved, but in September of the same year the eye became painful, and on examination it was noticed that iris was sluggish and did not respond freely to atropin. Retinal veins still conjested. Vision = $\frac{6}{9}$.

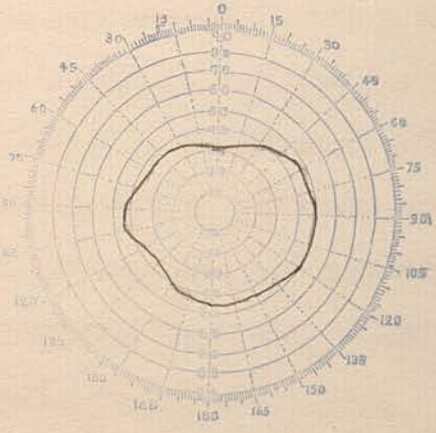
In November, some increase of tension was noticed, and the visual field found to be contracted. The condition

Visual Fields of J.E. page 28.

November. 1901.



January. 1902.



February. 1902.

condition of disc and iris remained unchanged. V $\frac{6}{12}$. Dionin and pilocarpin drops were ordered, and ~~this~~ their use was followed by some improvement.

When last seen in February, 1902, the tension was much diminished. V = $\frac{6}{9}$. Visual field wider.

He still complained of some pain, though it was not so severe as before. The fundus shewed less conjestion.

Pathology.

Macroscopically the anterior chamber was found to be well preserved, the cornea opaque, the retina detach-:ed with exudation between it and the choroid. Very little trace of iris could be seen.

Microscopically (PlatesNo.7+8) the lens is seen to be cataractous and surrounded by an exudate which at its posterior aspect contains a small haemorrhage. The corneal lamellae are separated , the ciliary body and choroid are detached, the ciliary body is infiltrated with round cells, the choroid is swollen and congested, there is a distinct retinitis, and the optic nerve end, which is drawn forwards by the detached retina, is swollen and covered with exudate. There is some increase of round cells in the substance of nerve (PlatesNo.9+10)

Subjective phenomena in true Sympathetic In-:flammation are, as a rule, at the beginning very slight, unless preceeded by irritative symptoms. Sometimes there is severe pain, but it is dimness of vision, gradually increasing,in nearly every case which first impels the patient to seek advice.

On examination of the eye at the early or serous stage of inflammation, if such be present, one finds the following:-

A more or less marked pericorneal injection, some dulling it may be of the surface of the cornea, with deposits on Descemet's membrane. The iris appears hyperaemic and swollen, the pupil small and responds sluggishly to light and accommodation. If atropinebe instilled, the pupil dilates,but irregularly owing to posterior synechiae, which, however, are as yet not very firm.

Ophthalmoscopically there is generally a haziness of the vitreous, and sometimes the presence of float-:ing bodies in it, indicative of choroidal changes. As in the case of McA. (page 26) deposits are some-:times seen on the anterior capsule of lens. Neuro-retinitis may be present, or simply a congestion of

of the disc. The fundus, however, is sometimes apparently free from any change.

The tension of the eyeball at the early stage of inflammation is very frequently raised, and as the condition advances it varies in degree, till actual softening sets in with shrinking of the globe.

It is possible to check the progress of the disease at the serous stage, and cases of complete cure with perfect vision are recorded. The danger of relapse however is ever present, and the plastic stage of inflammation sets in, when there is small hope of recovery. The inflammation may be plastic from the beginning, without any serous stage. The iris becomes thickened and disorganised, the lens cataract-:ous and firmly bound to the iris by exudation, these together bulge into the anterior chamber, which in consequence becomes extremely shallow.

The dimness of vision has gradually increased until there is now only a mere perception of light.

Owing to changes in the iris, lens etc., circulation is seriously interfered with, and as a result degener-:ative changes set in. The retina becomes detached, eyeball shrinks, sight completely goes, and the final stage of this malignant form of inflammation is a shrunken stump.

In some cases optic neuritis is the only objective symptom of Sympathetic Ophthalmitis. In the case of E (page 30) where neuritis is the important lesion, it is interesting to note the intense papillitis in the enucleated eye.

I find mention in the journals of a child, C. F., aet 2, who was admitted in July, suffering from optic neuritis in one eye, the result of injury to the ciliary region, with prolapse of iris, of the other eye. The injured eye was enucleated, and the neuritis in the sympathising eye completely disappeared.

Cases in which there is only an optic neuritis generally recover complete vision after removal of the irritating eye. This, however, is unfortunately not always the case.

Pathogenesis.

The factor necessary for the production of Sympathetic Inflammation and the manner in which it is transmitted, has given rise to much discussion. Four theories have been formulated, but as to which is the true one no conclusion has as yet been arrived at; much light, however, has been thrown upon the subject by these theories, and the investigations necessary for their demonstration.

1. The Ciliary Nerve Theory.
2. The Migration Theory.
3. The Schmidt-Rimpler Theory.
4. The Intoxication Theory.

The Ciliary Nerve Theory.

A reflex action of the vasomotor nerves of the iris and choroid, due to irritation of the ciliary nerve in the first eye, leading to dilatation of the vessels of the iris in the second eye, and to extrav-:asation of the fibrin and corpuscular elements. The essential of this theory is irritation followed by inflammation.

MacKenzie states that when one eye is irritated as by a foreign body, there is photophobia, injection, and lachrymation in the second eye. When endeavouring to

to explain the manner in which Sympathetic is pro-:duced, he says "The ciliary nerves also of the injur-:ed eye may be the means of conveying to the third and fifth nerves an irritation which may be reflected from the brain to the same nerve on the opposite side" "I think, however, that the chief medium through which Sympathetic Ophthalmitis is excited is the union of the optic nerve"

There is little doubt that irritation of the vaso-dilators can produce an arterial hyperaemia, but the question is, can this pass into an actual inflamm-:ation? In 1880 Rumpf and Mooren[10] shewed beyond doubt that irritation of one iris caused visible changes in the other iris, and further that a fibrinous exudation can be produced in the anterior chamber of the other eye after irritation of the first eye. They instilled a few drops of Essence of Mustard upon the portion of the iris of a rabbit. This was foll-:owed first by anaemia of the fellow iris and then by injection. If they continued to irritate the iris with Essence of Mustard the injection passed into hyperaemia, with clouding of the aqueous humour.

Jesner[11] shewed that irritation of the ciliary of trigeminus nerve of one side caused dilatation of the blood

blood vessels in the other eye, and increased secretion of albumen in the anterior chamber. He applied silver nitrate to the corneo-sclerotic margin of a rabbit's eye, killed the rabbit an hour after, and found the above changes.

Bach[12] irritated the anterior part of one eye by corrosive sublimate, electricity, and wounds, and his results corroborated those of Jesner. He asserts that the change found in the aqueous is similar to that found in a commencing iritis or cyclitis, and that the aqueous of the sympathising eye is similar to that which we get in purulent ulcers.

Moll[13] placed an aseptic piece of copper on the iris of one eye, and found not only the fibrin increased in the anterior chamber of its fellow, but also that a bacterium previously introduced into ~~the~~ a ~~avium~~ vein of the ear of the animal was present in this eye.

Disease of other parts of the body have been known to cause phenomena in symmetrical[m] parts, this, however, is rare. According to Praun,[14] Norris mentions a case where, after a wound of the outer side of thigh, complete anaesthesia ensued at a corresponding point on the other thigh, and a case by Annandale[4] of a painful scar on one hand, followed by analagous pain in

in the other hand.

In favour of the ciliary nerve theory, there are the trophic, sensory and motor changes sometimes observed in Sympathetic Ophthalmitis. Nettleship[15] quotes a case of Sympathetic Ophthalmitis with whitening of eyelashes.

Noyes[16] is of opinion that the range of accommodation is diminished.

Reich[17] reports a case of spasm of accommodation. The senory phenomena are tenderness and pain radiating into the region supplied by the first division of the 5th nerve.

Müller[18] has shewn from enucleated eyes that the cil-
:iary nerves of the first affected eye are not atro-
:phied, and are thus better able to conduct any influ-
:ence while the optic nerves were atrophied, and so incapable of conducting influences.

Krause[19] and others have found the sheath of the ciliary nerves infiltrated with round cells.

The fact that Sympathetic Ophthalmitis has occurred in cases of subconjunctival rupture of the sclera, leads one to think that the ciliary nerves must have some influence in the production of the disease, but Schirmer[20] has investigated all cases stated

stated to have given rise to the disease, and says that no such inflammation has occurred in any of them. He finds also that cases in which ossification in the cyclitic membrane has been blamed for it, there has been an inflammatory process in the uvea, and that in cases where we have a cystoid cicatrix, infection and not irritation is the cause.

In Panophthalmitis before perforation has occurred, when we have pain of the greatest intensity, why is it that we do not have Sympathetic Ophthalmitis, so also in Glaucoma, we have intense ciliary pain but no Sympathetic Ophthalmitis. Where it has followed Glaucoma, it is only after operation.

Against the Ciliary Nerve Theory is the fact that Sympathetic Ophthalmitis sometimes begins 3 or 4 weeks after enucleation.

Praun says we would have in such cases to assume a "neuritis ascendens", and that has been rarely observ-:ed; and that one would need to cut out all ciliary nerve irritation here, which, in the opinion of those who support the Ciliary Nerve Theory, preceeds in-:flammation.

In cases also of neurectomy, where the ciliary nerves are cut, irritation may begin before the cornea has become

become sensitive again after union of the nerves. It is difficult also to explain why inflammation may persist after enucleation of the exciting eye, if it is due to irritation.

The Migration Theory.

In 1881, Leber[27] formulated the theory that Sympathetic Inflammation was the result of aseptic infectious process in the first eye, and that the micro-organisms travelled along the optic nerve to the second eye.

Berlin[11] is also of the opinion that the disease is micro-organismal, but contended that it was transmitted through the blood vessels.

Snellen[28] agrees with Leber and says that in many wounded eyes which have led to Sympathetic Ophthalmitis, there have been observed, besides copious lymphoid cells, granular masses, which might be taken for accumulations of granular microphytes.

Leber[27] states that he has seen motion of molecules of different sizes in the optic nerve, as well as in different parts of the globe.

Deutchmann,[24] who was a pupil of Leber, endeavoured to prove

prove his theories. He showed by experiment that micro-organisms were present in the optic nerve; that they travelled to the other optic nerve; that Sympath-:etic Ophthalmitis could be set up by Staphyloccus Aureus and Albus; further that in nearly every case of Sympathetic Ophthalmitis the bulb had been opened, thus affording a possibility of infection. He con-:cluded that Sympathetic Ophthalmitis was an infect-:ious disease, and that infection was transmitted by the optic nerve. He suggested therefore that the disease should be called "Ophthalmia Migratoria" or "True Sympathetic Inflammation", and that Sympathetic Irritation was a condition quite apart.

It seemed after Deutchmann's experiments were published that the oetiological question of Sympathet-:ic Ophthalmitis was settled, but unfortunately no other observers were able to support Deutchmann.

Alt[25] drew a thread saturated with croton Oil through the optic nerve of a rabbit's eye, and noticed a neuro-retinitis of the other eye on the 4th or 5th day afterwards, which, however, disappeared in a week. He then used Abrus Precatorius, but the animals generally died a few days afterwards. In one case a genuine plastic irido-cyclitis followed in the other eye

eye. On examination of the optic nerve in this case he found a small celled infiltration of its sheath, and concluded that the inflammation passed over directly from the infected eye, and that the tract was by the optic nerve.

Gifford[26] in 1886 published a series of experiments. He first used Staphylococci, and in all the cases a panophthalmitis followed, and in three a rupture of the globe. No Sympathetic Ophthalmitis resulted in the fellow eye. He next used the Anthrax bacilli, and in three cases out of twenty five, he found the bacilli in the perichoroidal space of the other eye. He found also exudation in the vitreous body and along the central vessels, also in the supravaginal space posterior to the point where the central vessels leave the nerve. In the cranial cavity, in front of the chiasm, and between the optic nerves bacilli and exudation were to be seen. The bacilli were also present between the sheathes and in the innerlayers of the dural sheath. They were also found in great quantity in the central vein.

Gifford concludes that in rabbits, organisms can be carried by the lymph stream from the vitreous body of one eye to the space around the choroid in the other

other, and that the most direct path taken by them is not by the optic nerve, but, leaving the first optic nerve with the vessels passes through the orbit into the cranial cavity, and thence by the subvaginal to the subchoroidae space of the second eye.

Schirmer, Greef, Ulrick, Randolph and others have made experiments similar to Deutchmann, but by no observer has he been supported.

Schirmer[44] suggests that it is probably due to an organism which does not cultivate on any known medium.

The fact that we sometimes have Sympathetic Ophthal-:mitis even after resection of the optic nerve is rather against the migration theory. Deutchmann says, however, that the tissue which joins the cut ends is permeable to lymph.

Bach,[27] Velhagen[29] and Zimmerman[29] say that it is not permeable to lymph.

Against the migration theory is also the fact that we do not have Sympathetic after acute panophthalmit-:is. Several explanations have been vouched to ex-:plain this.

Leber and Deutchmann[44] say that perforation occurs and the organisms are discharged, tSchmidt-Rimpler[31] found the pyogenes aureus in a ball that had ruptured four weeks

weeks after, and these set up inflammation when injected into a rabbit's eye.

Gifford[34] says that the lymph channels become blocked by a fibrinous exudation, and so infection is not spread. It is most unlikely, however, that micro-organisms cannot permeate a fibrinous exudate.

Schirmer[14] says that in panophthalmitis we have a mixed infection, and that the staphylococci kill other organisms, but this is dis-approved by the fact that other organisms have been found after panophthal-:mitis. Gifford found organisms in a case suffering from panophthalmitis before the eyeball ruptured, he also found active organisms in an eye after the acute inflammation had passed on to phthisis bulbi without rupture.

If the migration theory be correct it seems strange that we do not get meningitis in cases of Sympathetic. Deutchmann[14] has endeavoured to explain this by saying that the organisms, in order to reach the other eye, have to fight their way up the lymph stream, and as a result become exhausted and incapable in infection. The power of infecting, however, returns after they have been carried down by the lymph stream to the other eye.

Against the migration theory is the fact that we seldom have retinitis or neuritis, especially at the beginning of the disease: it is generally the anterior part of the uveal tract which first shews signs of inflammation.

The Schmidt-Rimpler Theory.

In 1892 Schmidt-Rimpler[31] formulated the theory that ciliary irritation leads to vasomotor disturbance in the other eye, and so predisposes it to Sympathetic Ophthalmitis. He lays weight on the degree of irri-:tation.

Bach[32] further extends the hypothesis of Schmidt-Rimpler, and says that every irritation in the second eye declines or increases according to the intensity of the first, and the longer the irritation and pain last in the first eye the longer it lasts in the second.

Theobald[33] suggests that the ciliary nerves contain Sympathetic as well as sensory fibres, and it is likely that the former have most to do with trophic changes, and the latter with disturbances of sensat-:ion: one set may be more pronounced in certain persons

persons and so explain why we have Sympathetic Irri-
:tation in one case and Sympathetic Inflammation in
another.

Bach further states that by looking at Sympathetic Ophthalmitis as a neurotic inflammation we can ex-
:plain the different changes which take place, eg. Changes in the uveal tract, owing to circulary dis-
:turbances, the time, inconstancy of the disease, and the therapeutic results.

If there be another cause present, as is essential in the Schmidt-Rimpler theory, we can explain why enucleation does not stop its progress.

Bach[45] thinks transference from one eye to the other takes place either directly by the nerves of the Circle of Willis, or indirectly by irradiation to the opposite side by the centre in Medulla Oblongata.

Weiss[34] observed a case which arose in an albuminuric patient, and thought the albuminuria was the deter-
:mining factor.

A similar disposition to the disease is manifested in children, and is most liable to occur in the neorotic and weakly.

The Intoxication Theory.

It would seem from experimental results and clinical observation that the pathogenesis of Sympathetic Ophthalmitis cannot be explained by the direct transference of pyogenic organisms from one eye to the other. The ciliary nerve theory is not sufficient to explain all the different changes which take place, and it demands that a progressive inflammation may be caused reflexly. It has been suggested, therefore, that the disease is produced by the action of toxines, transmitted from the exciting eye. Rosenmeyer[35]. Gorecki[36]. Müller[37].

Bacchi[38] says that Sympathetic Ophthalmitis is occasioned by chemical changes in the intraocular fluids, and that he has been able to produce it by injecting certain sterile fluids into the eye of animals. He assumes that it takes place reflexly.

Graefe[4] refuses to accept the toxic theory on the ground that he has observed no temperature, but Pflüger[40] has seen both temperature and headache.

In diphtheria, influenza, and certain other micro-organismal diseases, we have a toxine developed which sets up organic changes in structures apart from the original seat of disease, and which may give rise to symptoms

symptoms only after considerable lapse of time. In diphtheria, we have inflammation of sensory and motor nerves. In influenza, we have inflammation of the optic nerve. Why not inflammation of the vaso-:motor nerves in Sympathetic Ophthalmitis? In osteomyelitis joint affections are present, and in many such cases no organism has been found in the joint to account for the changes.

By the Intoxication Theory we can to some extent understand why in some cases of malignant tumour growth we have Sympathetic changes set up in the fellow eye, for there is undoubtedly a toxine pro-:duced in such cases. It is essential, however, that a plastic cyclitis be also present, and the tumour generally implicates the ciliary region. If such toxines can produce Sympathetic it to some extent disapproves the theory that we have a specific micro-organism present in cases of true Sympathetic Ophthal-:mitis.

Praun suggests four ways by which the poison may be carried from one eye to the other:-

1. By the lymph stream. 2. By the blood.
3. Through the vasomotor centre by absorption of the toxine.
4. The products may remain local and act chemically, thereby setting up reflex changes.

According to Bach and Bacchi,[14] the 4th way is the most likely, but it fails to explain why Sympathetic is not set up in acute panophthalmitis where, even were the micro-organisms destroyed, it is inconceivable that the toxines are also rendered harmless.

Moll's[13] experiments lead one to think that the poison may be transmitted by the blood stream. He injected into the vein of a rabbit's ear cultures of the bacillus pyocyanus, and then irritated the iris by inserting a fragment of copper into it, Cultivation of the fluid obtained by tapping the anterior chamber of both eyes gave colonies of the bacilli, if however no irritation had been applied, the results were negative.

Selenkowsky[4] in 1900 made a series of experiments with a toxine, of considerable strength, of the staphylococcus pyogenes aureus. In the first series he introduced the toxine into the intervaginal space at the peripheral end of the optic nerve, which he divided at the point of entrance into the orbit. The toxine found its way to the choroid and retina and also to the ciliary body and iris, causing in all these situations violent inflammation.
In the second series, in which the injection was made

made into the intervaginal spaces of the nerve close to the globe, choroiditis and papillitis, as well as cyclitis and iritis, occurred: but the choroidal inflammation appeared to be less severe and less permanent in its results than that of the iris and ciliary body.

In a third series, the toxine was introduced into the posterior half of the vitreous, and found its way by the optic nerve to the other eye.

He concluded that Sympathetic may be capable of taking its rise from the passage of toxine from one eye to the other.

From an anatomical study, of eyes which had been enucleated on account of their having set up Sympathetic, we find in all cases that a plastic cyclitis is present, and all observers are, I think, agreed that this is essential for the production of Sympathetic Inflammation. It is possibly on account of the difficulty of producing a plastic cyclitis in animals that the many experiments have proved so futile. In addition to a plastic cyclitis we find in most cases a more or less complete separation of the retina. The retina becomes degenerated and streches across the eyeball in form of a fibrous cord, attached

attached at one extremity to the optic nerve, and at the other to the pupillary membrane or lens, as the case may be. (Plate No. II.)

Snellen[23] concludes from the manner in which the retina is detached, that the lymphatics through the iris and the anterior part of the eye are closed, while those of the posterior part are becoming dilated.

In one case which I examined there was a well marked pathological cupping of the optic disc (Plate No.) and in another a slight physiological cupping. The anterior lymphatic channel in both cases was apparently quite closed. (Plates No.)

The nerve substance and its sheaths in only 2 or 3 cases which I examined shewed an infiltration of round cells, and this, I think, one would expect to be more often present if micro-organisms themselves were transmitted from one eye to the other by way of the optic nerve, either directly, through its tissues, or by its lymphatics. It does not, however, exclude the possibility of a toxine taking this path, and both clinical and pathological evidence leads one to think that the toxic theory is to a certain extent the true one. It would seem, however, that a toxine by itself is unable to produce Sympathetic Ophthalmitis, but that

that we must have something else capable of so affecting the other eye that a change similar to that in the exciting eye can be produced. Plastic cyclitis + a toxine would explain most cases of Sympathetic Ophthalmitis, and from an anatomical study the idea suggests itself that the plastic cyclitis acts in a mechanical way, namely, by dragging upon the ciliary nerve, and so setting up a reflex vasomotor disturbance in the other eye, which is transmitted by the ciliary nerves of one eye to the ciliary nerves of the other, through their centre in the Medulla Oblongata.

Against this theory is the fact that we sometimes get an optic neuritis with no change in the anterior part of the uveal tract. A neuritis which exists by itself, as a rule soon disappears after the other eye has been removed, and does not tend to return again. In cases where the neuritis is said to the Sympathetic in character one would expect the disease to gradually advance instead of disappearing, even after the exciting cause has been removed. It may be in such cases that the toxine has travelled from the exciting nerve by way of the optic nerve, to the fellow eye, irritating by its passage the tissues of the optic nerve, but

but owing to the fact that the ciliary region is not yet in a condition to become affected by the toxine the inflammation remains localised to the optic nerve.

Knies[87] reports a case of serious iritis, in which both optic nerves and the chiasma were infiltrated with round cells. This was a double case of serous iritis and it was not sympathetic in character. Other cases have been reported, which shew that a neuritis can pass from one eye to the other by way of the optic nerve, where no sympathetic inflammation has existed.

If due to a toxine alone we cannot satisfactor-:ily explain the reason why Sympathetic Ophthalmitis is not caused by acute panophthalmitis, we can, how-:ever, to some extent understand this if we combine a ciliary action with that of a toxine, for, when the acute stage of panophthalmitis has passed and shrink-:ing of the globe sets in, there is always a risk of Sympathetic, and cases have been reported at this stage.

In Hypopyon ulcer, where, according to the latest investigation, we have chemical changes due to the production of a toxine, and absence of micro-organisms, one would expect to find Sympathetic, but never to my knowledge has a case been reported unless after perforation.

The fact that we do not get optic neuritis very frequently as a primary lesion is rather against the theory that the optic nerve by its lymphatics is the channel by which the poison gains access to the other eye. If, however, we assume that the ciliary region is in a condition, as it were, to receive the poison we can understand why this region first becomes affected.

The increased tension which occurs so frequently in the early stages of the disease points to some ciliary nerve influence whereby an increased secretion is produced owing to irritation of the ciliary body;

Prognosis.

In cases of Sympathetic Irritation the prognosis is favourable. No further trouble, as a rule, is experienced after the exciting eye has been extirpated. When, however, the stage of actual inflammation is reached, the prognosis becomes extremely grave, especially if the inflammation has become plastic in character, when recovery is almost hopeless. Randolph[42] states that he has collected 19 cases of complete recovery in the last 20 years. Critchett[43] describes a case of recovery with perfect vision after excision of the exciting eye. Some cases are also reported by Ard[44] and Bowman.[45]

It is unfortunate, however, that we cannot really say when complete recovery has taken place, for relapses are the rule, and not the exception in this dangerous disease, and in spite of all treatment the eye may be subjected to repeated attacks of inflammation, till the final stage of complete and irretrievable blindness ensues. When the disease has reached a certain stage the exciting eye seems to have little or no effect on the sympathiser, and enucleation does not retard the progress of inflammation in the fellow eye.

Treatment.

There are few cases in surgery which entail a greater responsibility to the surgeon than an injury to the eye, especially if it be a perforating wound, for in all such there is a possible risk of Sympath-:etic Ophthalmitis.

The treatment must be divided into

1. Preventive. 2. Curative.

Preventive.

Undoubtedly the question of how we are to prevent the occurrence of Sympathetic is of the greatest importance, and must have the first con-:sideration.

All penetrating wounds, however slight, should be looked upon as a possible source of trouble to the fellow eye, and the most careful treatment adopted to prevent an inflammatory sequence to the injury. To enter into the treatment of such injuries however, can hardly be considered as part of my subject, and I shall confine myself to the management of such cases where experience has shewn that Sympathetic Ophthalmitis is likely to follow.

The removal of the irritating eye is the only real prophyllactic measure which one can adopt, but this treatment would be rather drastic were we to follow it

it out in all cases of perforative wounds of the eyeball.

Carter, in an article on the management of severe injuries of the eye says, "There are, I believe, practitioners who adopt what our forefathers would have called "A short way" in such cases; and who invariably remove an injured eye in order, as they say, to afford security to the sound one, without very much consideration of the loss suffered by the patient. Such practice can hardly be called either science or surgery; for it is clearly the duty of the surgeon to be conservative as circumstances will permit, and to preserve as much of any organ or endowment as may be possible".

The following general rules are adopted in this Institution by Dr. A. M. Ramsay.

1. If an injured eye be blind and painful, it is expedient to enucleate, more especially if the patient is not to be under constant medical treatment.

2. If a foreign body be known to be present in the eye, which every now and then is subject to attacks of inflammation, enuclation must be urged, even although there be some sight present. Of course, if the foreign body can be removed, its extraction should always

always be attempted before the more radical operation is resorted to.

3. Enucleation must be performed at once if there be any indication of Sympathetic Inflammation. If Sympathetic Inflammation has advanced far, and the exciting eye still retains some sight, the surgeon has a very difficult problem set before him, because, in the long run, the exciting eye may turn out to be the better of the two. No rule can be laid down for the management of such cases, each must be considered on its own merits, and, speaking generally, it may be said that the more sight there is to save in the sympathising eye, the greater the price to be paid for it by the excitor.

Pritchard was the first to practice enucleation, but other operations have since been adopted in order that a moveable stump may result.

Graefe in 1884 introduced evisceration, and later Mule recommended a modification which consisted in introducing a glass ball into the scleral cavity to obviate the shrinking which occurred after evisceration. In both operations it is very essential to entirely remove everything except sclera.

In 1890 Boucheron performed neurotomy for the first time. This operation, like others however, is apparently no safeguard against Sympathetic Ophthalmitis, for the optic and ciliary nerves frequently unite, and cases of Sympathetic Irritation and Inflammation have been reported to follow.

Enucleation is undoubtedly the safest method.

Berry[46] says "From a recent elucidation of the pathology of sympathetic disease, it becomes evident that the operation which enables one to remove the largest portion of the course along which the infecting matter travels must afford the greatest chance of success, Hence the advisability of performing enucleation instead of evisceration".

The latest method adopted for obtaining a moveable stump after enucleation is to pour melted sterilised paraffin wax into the capsule of Tenon, and stitch the muscles and conjunctiva over it.

Curative.

Although treatment in the case of the sympathising eye is frequently of little avail, yet if a patient is willing to place himself unreservedly in the surgeon's hands and follow out instructions carefully

carefully, the course of the disease can at least be checked to a certain extent, and useful vision is retained for a considerable time.

The following case I shall report as example of the treatment adopted, and of the improvement which foll-:owed:-

D. McA., as already stated, (page 35.) was admitted to the Ophthalmic Institution on February 7th, 1900, with a rapidly advancing Pernicious Iritis in the left eye, and the right a shrunken irritable stump. He could barely discern fingers at 2 metres distant with his left eye.

On February 8th the right stump was enucleated.

Atropine was instilled into the left eye: an oint-:ment composed of Mercury and Belladonna massaged into the left temple twice daily, and a pill contain-:ing Grey Powder gr. ii and Quinine gr. i given internally thrice daily.

Bright light was excluded by the use of tinted glasses.

On the day following operation his condition was much improved, the iris dilated more freely to atropine, though very irregular, and the pericorneal injection was less marked. Patient said his vision was more distinct, and the black specs appeared less numerous.

The above treatment was carefully carried out, and on the 17th his vision was $\frac{3}{60}$: pupil well dilated but still irregular: cornea clearer, with blood vessels invading its margin: the vitreous much less cloudy than on admission, but the deposits on Descemet's membrane, and the anterior capsule of the lens ~~was~~ were still well marked.

He was dismissed to the Convalescent Home with instructions to continue the same treatment, with the exception that a mixture containing Iodide of Potassium and Perchloride of Mercury was substituted for Grey Powder and Quinine.

On the 5th of March he reported himself at the Dispensary. His vision then was still $\frac{3}{60}$, but the eye looked much more healthy. Patient was warned to do no work, but in spite of warning he went to work a few days later, and was re-admitted on the 13th of March complaining that on the previous day he had suffered severe pain in the eye. The vision was very much reduced, and he was unable to distinguish types or count fingers at one metre distant.
On examination, the pericorneal injection was found to be much more marked: tension increased: ciliary tenderness present: pupil very small and irregular: and the media more hazy than when first admitted.

Patient was put to bed, and a seton inserted into the back of neck, and Mercury etc. given as before.

On the 15th there was considerable improvement. He complained less of pain and tenderness, and the pupil shewed signs of yielding to atropine.

On the 18th a subconjunctival injection of Bicyanide of Mercury $\frac{1}{2000}$ gr in a 5% solution of Chloride of Sodium was given. On the 22nd this was repeated. By the 25th a marked improvement was noticed. V = $\frac{6}{24}$: the pupil well dilated and not nearly so irregular: the cornea much clearer, but the media still hazy, and no view of fundus could be obtained. No pain or ciliary tenderness present.

He was dismissed to the Convalescent Home on the 1st of April, his condition as stated above.

From this and other cases which I have had under treatment here, I am convinced that Mercury has a most beneficial effect on the disease in its early stage, and that, while the patient is thoroughly under its influence, short of salivation, further progress can be checked.

It is essential not only that the patient be kept under the influence of Mercury, but that the eye be kept at absolute rest. Stimulation by bright light avoided

avoided by the constant wearing of tinted glasses. Atropine is of great service, but must be used guard-:edly, and if the tension is increased Eserine some-:times proves of benefit. In the case of E., (page) where the tension became high, the instillation of a 2% solution of Dionine and Pilocarpine was followed by a marked improvement.

If there is much pain, hot fomentations or dry heat in the form of "Japanese Muff Warmers" afford relief. A seton is at times a valuable agent in assisting to check the progress of the disease.

No end of examples of cases in which operation is performed at a late date may be given to shew the futility of operative procedure. The iris has become moulded and firmly adherent to the anterior capsule of the lens, and not only is this so but its tissues are rotten. When grasped by the irridectomy forceps the small piece caught by the blades is pickedaway from the hypertrophied pigment portion, which is still left firmly sealed to the lens. A coloboma so produced is soon filled up by exudate.

No operative treatment is advisable until the eye is quite quiescent.

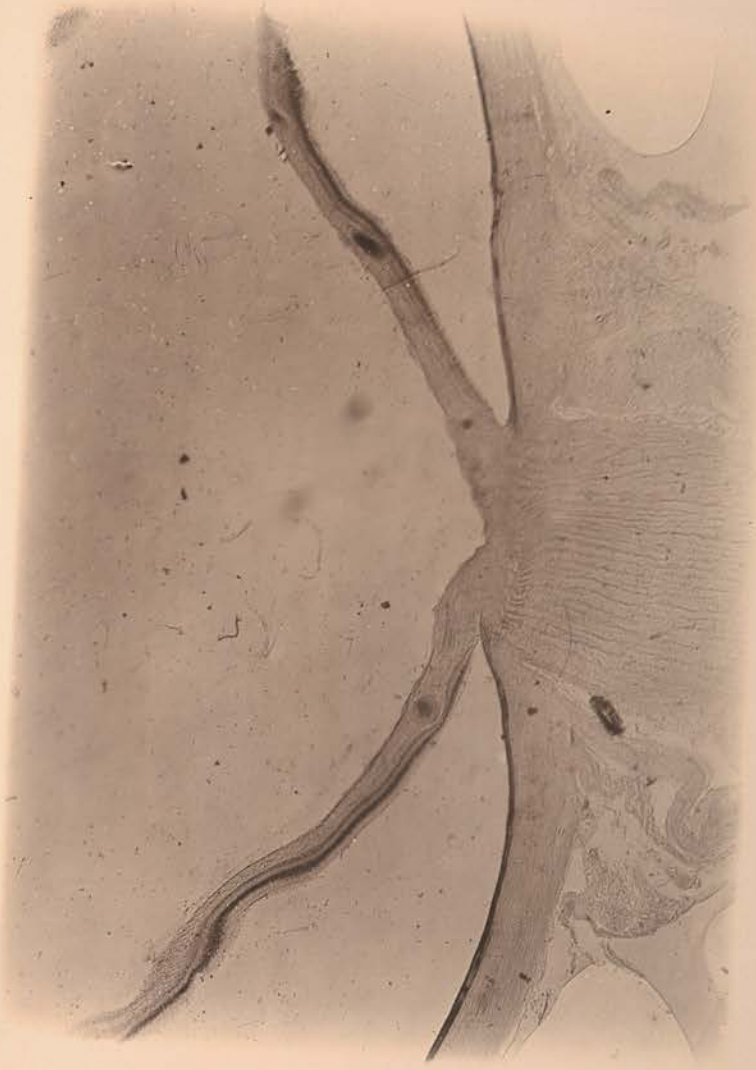
In cases where the lens is opaque, and the iris firmly

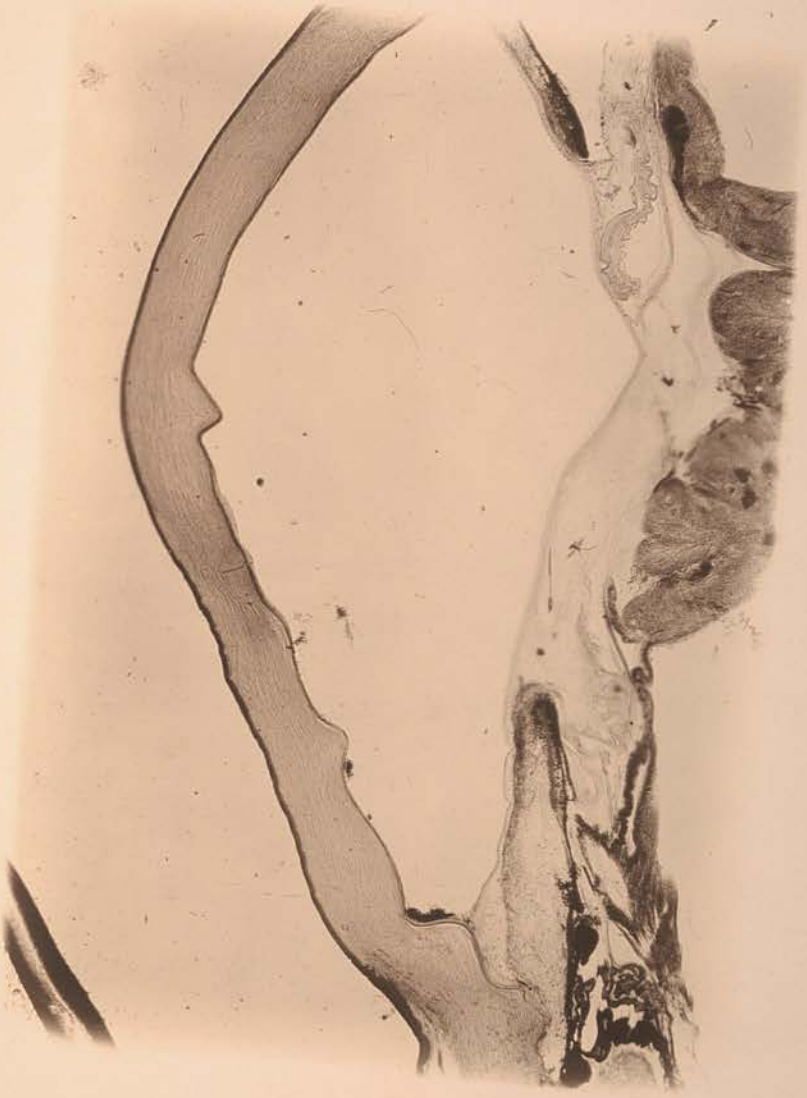
firmly bound down to it, and where there is still a perception of light, Critchett[47] recommends the foll-:owing:- A fine needle is passed into the centre of the opaque lens, which is pierced, another needle is passed in from the opposite side, and thus a small opening is made in the capsule. This is re-:peated several times, a period of several weeks being allowed to elapse between each operation. He has reported several cases where this operation gave useful vision.

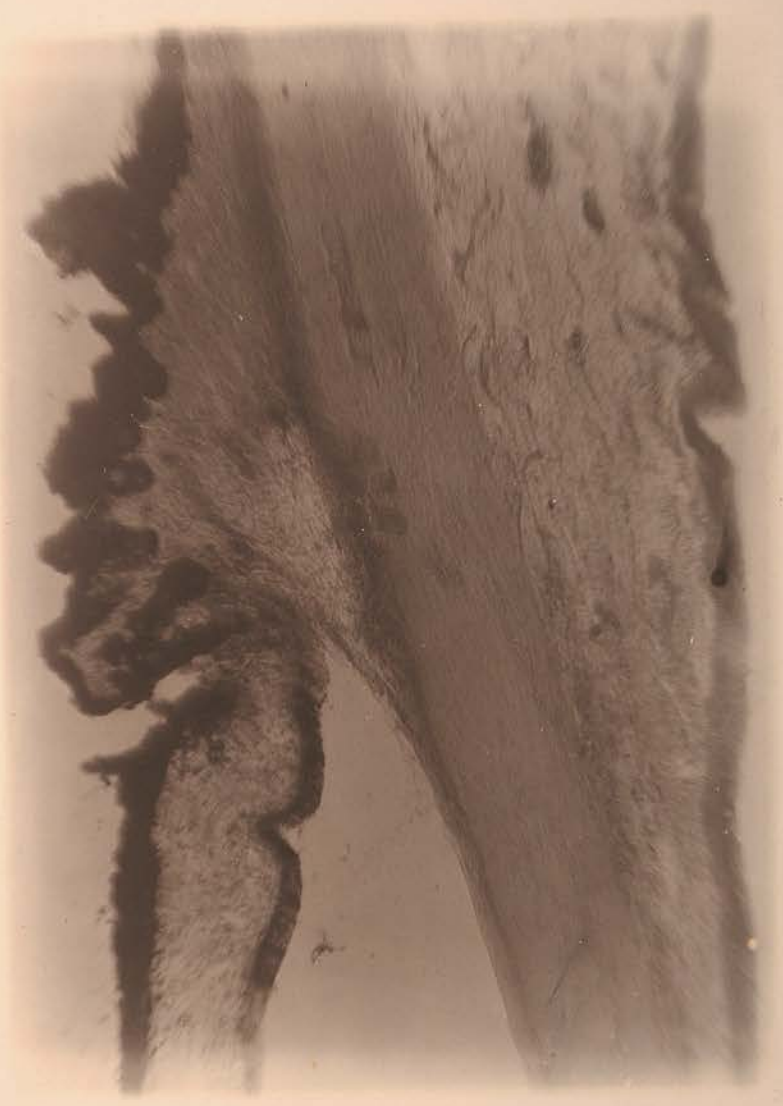
Lawson recommends to transfix all the tissues with a linear knife, and cut out making a flap, through which the lens and as much of the iris as possible are subsequently removed.

From the very description of these operations, however, it is obvious that no one can operate on a case of advanced Sympathetic Ophthalmitis with a light heart. The chances of failure are infinitely greater than the chances of success, at the same time it must not be forgotten that the smallest inprove-:ment in vision means a very great deal to anyone who has been totally bereft of sight, and that success ought to be obtained in some small measure at least if the operation be undertaken only after the eye has recovered as thoroughly as possible from all

all symptoms of inflammation, and if the utmost care be taken to secure rigorous asepsis.







References.

1. MacKenzie, Practical Treatise on Diseases of the Eye, 1839.
2. Bartisch, Augendienst, Dresden, 1583.
3. Brondeau, Des Affections Sympathiques de l'un des yeux a la suite d'un blessure de l'autre oeil, Paris, 1858.
4. Demours, Traite des maladies des yieux, Paris 1818.
5. Randolph, System of Diseases of the Eye, Norris and Oliver, vol. lll.
6. Bronner, Tr Ophth. Soc. U King. Lond, 1893 - 4 XlV.
7. Schirmer, Archb. Oph. xxxviii. iv., s.95.297.
8. Brailey, Oph. Hosp. Report, London, 1886.
9. Alt, Am. J. Oph. St. Louis, 1899. xvi.
10. Rumpf & Mooren, Centralbl der med. Wissench, 1880.
11. Jesner, Arch. f. Psych. Bd. xxiii.
12. Bach, Bericht uber die xxiv. Versamml der Ophth. Gesell. Heidleberg, 1895.
13. Moll, Annales d'oculistique, 1898.
14. Praun, Die Verletzungen Des Auges, 1899.
15. Nettleship, Trans. Oph. Soc. U.K. Vol iv.
16. Noyes, Diseases of the Eye. 1890.
17. Reich, Annales d'oculistique. 1876. lxxv
18. Muller, Archiv. f. Ophth, 1858. i

19. Krause, Archiv. f. Augenheilk. 1882 x.

20. Schirmer, Archiv. f. Oph. xxxviii. iv.

21. Leber, Archiv. f. Oph. xxviii. i.

22. Berlin, Volkmanns Sammlung Klin. Vortrage, 185.

23. Shellen, Trans. Internat. Med. Cong. Lond. 1881.

24. Deutchmann, Archiv. f. Oph. xxviii. xxix. xxx.

25. Alt, Trans. American Oph. Soc. 1899.

26. Gifford, Archiv. Oph. xv.

27. Bach, Archiv. f. Ophth. xlii.

28. Velhagen, Archiv. f. Augenheilk. xxix.

29. Zimmermann, Archiv. f. Oph. xlii.

30. Gifford, Arch. f. Oph. xvii.

31. Schmidt-Rimpler, Arch. f. Oph. xxxviii

32. Bach, Archiv. f. Oph. xlii.

33. Theobald, Arch. f. Oph. xiii

34. Weiss, Arch. f. Augenheilk. xxv.

35. Rosenmeyer, Internat. Kongr. iv.

36. Gorecki, Societe d'Ophth de Paris, 1891.

37. Muller, Wien. Klin. Wochenschr, 1894.

38. Bocchi, Atti d-xi, Internat. Congr. Roma.

39. Knies, Ueber, Sympath, Aug, Wiesbaden.

40. Pfluger, Bericht. Uber die Ophth, Heidleberg.1892.

41. Sclenkowski, Klin Mon f Augenheilk, 1900.

42. Critchett, Edin. Med. J. 1897.

43. Ard, N.Y. Eye & Ear Inf. 1897.

44. Bowman, Trans. Oph. Soc. N. K. Lond. 1882-3 iii.

45. Carter, Clinical Journal, 1894.

46. Berry, Diseases of the Eye, 1889.

47. Critchett, Royal London Ophth. Hosp. Report. x.

48. Goldzieher, Therapie der Augenkrankheiten.